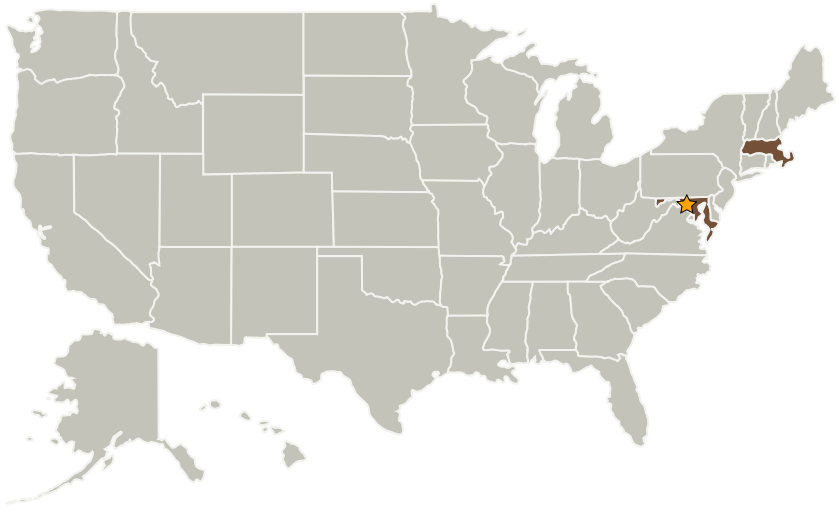
Integration of Full-Spectrum Metrology and Polishing for Rapid Production of Large Aspheres, Phase II

Completed Technology Project (2004 - 2006)

Project Introduction

We propose to design, build, and test a major new instrument capable of both measuring and polishing the surface of aspheric mirrors up to 1.2 meters in diameter, and up to f-0.5 in speed, either concave or convex. In the successful Phase I proposal, we laid out the instrument to the component level, and laid out and analyzed every critical subsystem. We also investigated and experimented with the fluid jet polishing to be used by this instrument, setting the stage for further experiments and ultimate usage in Phase II. The metrology accuracy goals, supported by previous measurements, are 1 nanometer rms for full aperture figure, and 0.1 nm rms for mid-frequency and micro-roughness. The full-aperture and mid-frequency metrology approaches are based on previous successful SBIR projects, while the micro-roughness metrology is an improvement on standard Total Integrated Scatter measurements developed under Phase I. All of the metrology instrumentation is integrated into a single measurement head. At the end of the project, we will polish and measure an f-1.1, 560 mm parabola, and possibly an 890 mm, f-2.5 sphere.

Primary U.S. Work Locations and Key Partners



Integration of Full-Spectrum Metrology and Polishing for Rapid Production of Large Aspheres, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Integration of Full-Spectrum Metrology and Polishing for Rapid Production of Large Aspheres, Phase II

Completed Technology Project (2004 - 2006)

Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Bauer Associates, Inc.	Supporting Organization	Industry	Natick, Massachusetts

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers